the SPT Journal

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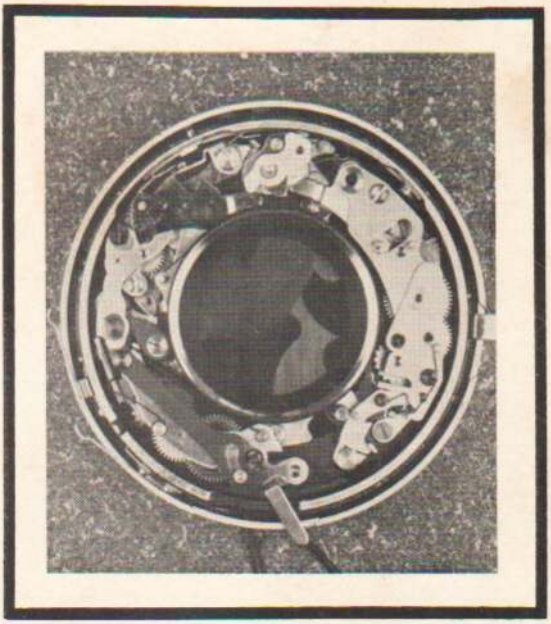


SERVICING THE COPAL SVE SHUTTER

MAY/JUNE 1972

Servicing the Copal SVE Shutter

(as used on the Yashica Lynx 14E camera)

Written especially for SPT by James Todd Amos

Test results prior to teardown:

Bulb	OK
1 second	+20%
1/2	+10%
1/4	+10%
1/8	+15%
1/15	+10%
1/30	-0-
1/60	-10%
1/125	+5%
1/250	+15%
1/500	-0-
X Synch	OK
M Synch	OK
Time Delay	9.0 Seconds

Shutter speed results shown in % deviation from 100% accuracy.

Unlike other Copal models, the time delay on the Copal SVE may be set when the synch selector is on "M".

Disassembly

(Short cut: to get direct access to the front of the shutter, go directly to the second paragraph.)

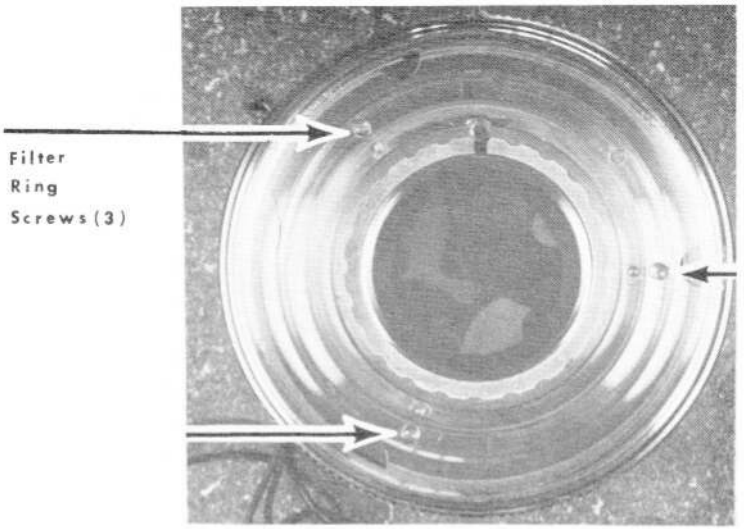
Remove the three brass screws from the inside of the filter ring assembly and lift off the filter ring assembly. Now remove the three brass screws revealed in the top of the shutter speed indicator ring and lift off the ring assembly. Now revealed is the exposure resistor band ring assembly. Lift it straight out.

Turn the half circle screw head so that its flat side faces the inside of the shutter. Unscrew the scalloped ring. The diaphragm indicator ring, ASA setting mechanism and shutter front plate can be lifted out as an assembly. If you took the short cut the exposure resistor band ring, shutter speed indicator ring and filter ring assemblies will also be a part of the assembly you lift out.

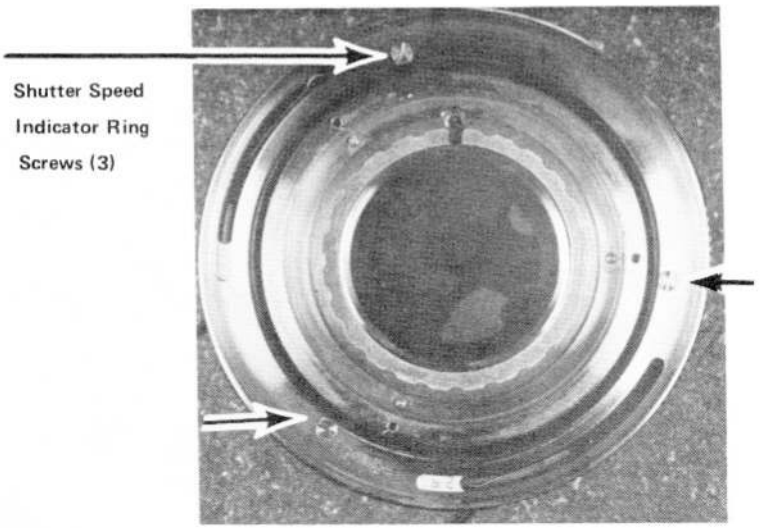
To separate the shutter front plate (and exposure resistor band ring bearing attached to it) from the diaphragm indicator ring, push the diaphragm indicator ring off towards the rear. Note that the surfaces between these two components is lubricated with a smooth, heavy grease. The diaphragm indicator ring is not detented.

Lift off the speed cam. Note that the speed cam detent is provided by a spring operating on the edge of the speed cam.

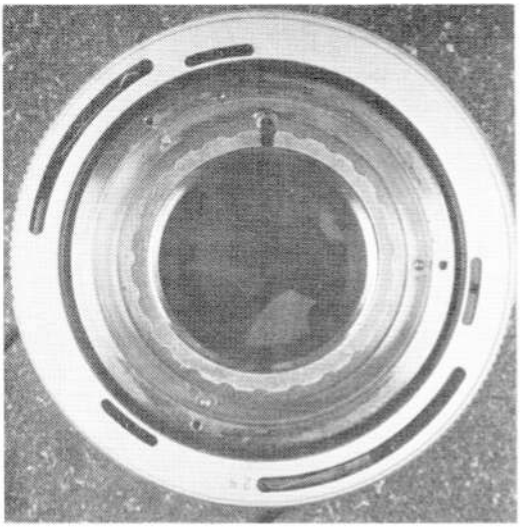
The shutter housing is enclosed in a shell, or false housing. Removal of the shell is necessary only to replace the exposure resistor band brushes which are attached to the side of the shutter



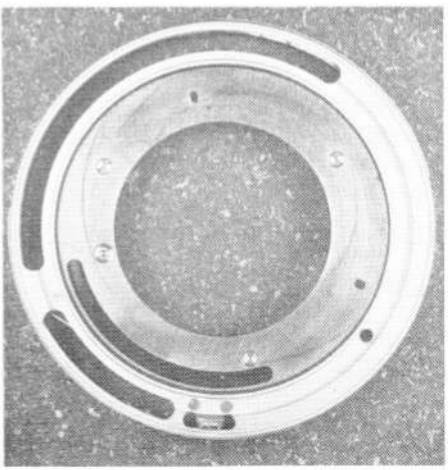
Shutter front, as supplied for Yashica Lynx 14 E.



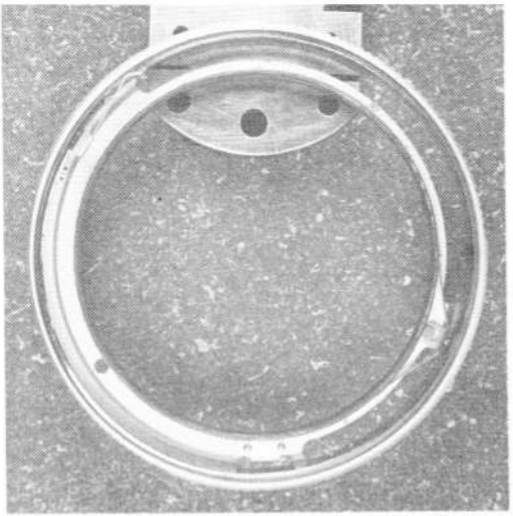
Shutter front with the filter ring removed.



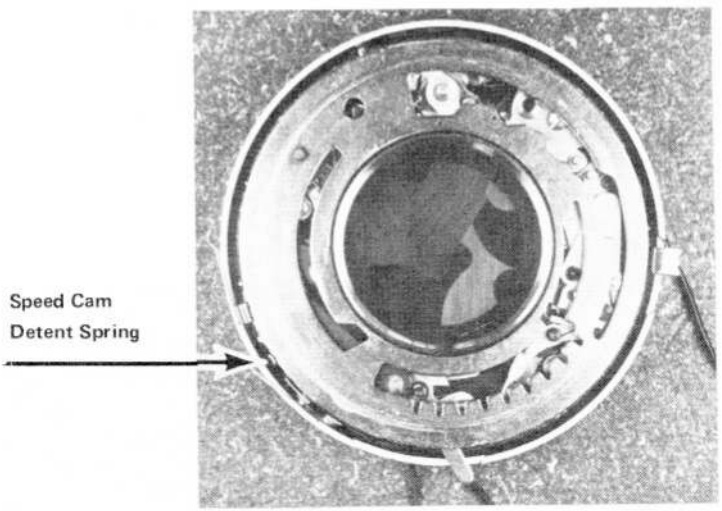
The exposure resistor band assembly is revealed after the shutter speed indicator ring is lifted off.



The back of the shutter front plate, with the diaphragm indicator ring surrounding it.



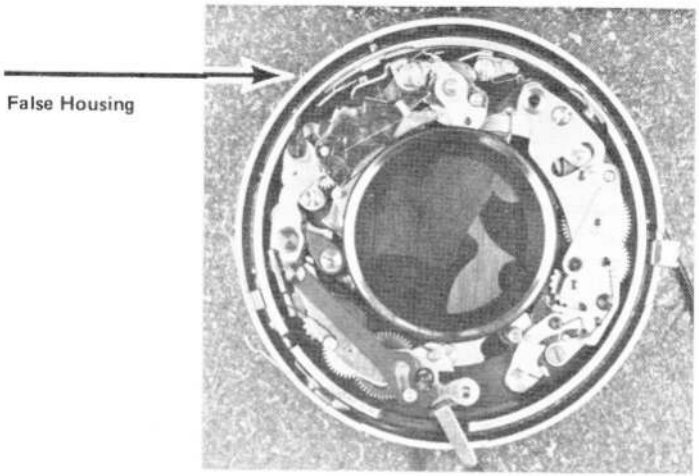
The front side of the diaphragm indicator ring may be seen once the shutter front plate is separated from it. Note the detent ball and spring for the ASA setting.



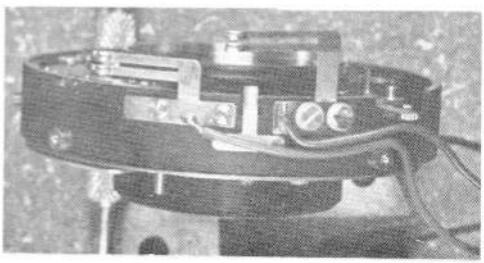
The shutter speed cam is revealed once the shutter front plate is removed. Note that the speed cam detents on its side, not on its top surface.

housing. Remove the three small screws located around the shell, and slide the shell off to the rear. The taller brush is the one with the blue wire attached, and is located to the right of the other brush. Note that this brush with the blue wire is insulated from the shutter housing by means of plastic washers. The shorter brush is not insulated, has a brown wire attached to it, and has no plastic washers used to attach it.

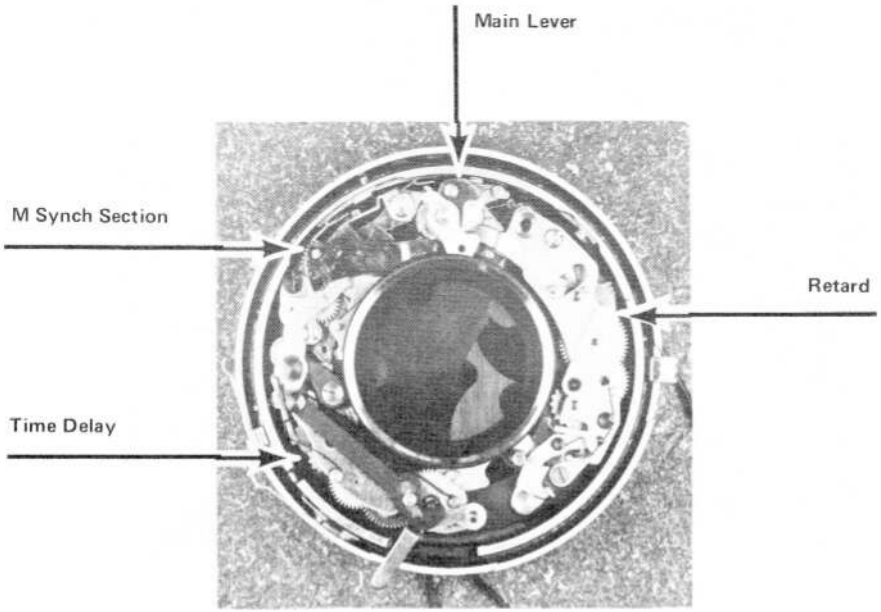
To remove the retard, the two mounting screws must first be removed, and then the retard can be lifted out. Copal has a reputation for cementing screws, and these retard screws are very likely to be cemented. Place a drop of solvent on top of each one and allow it to soak in for a while. Be sure your screw drivers are the right size and properly ground. Please note the two black spacers under the retard and remove them.



The front of the shutter with the speed cam removed.



The exposure resistor band brush wiring is accesible after the false housing is removed. Note the shutter speed cam detent in the center.



Major areas of importance on the Copal SVE.

plate and the silver screw in the top plate and lift it out. Remove the M synch contact screw and lift out the M synch contact spring, M synch contact and the M synch retard lever with its spring underneath.

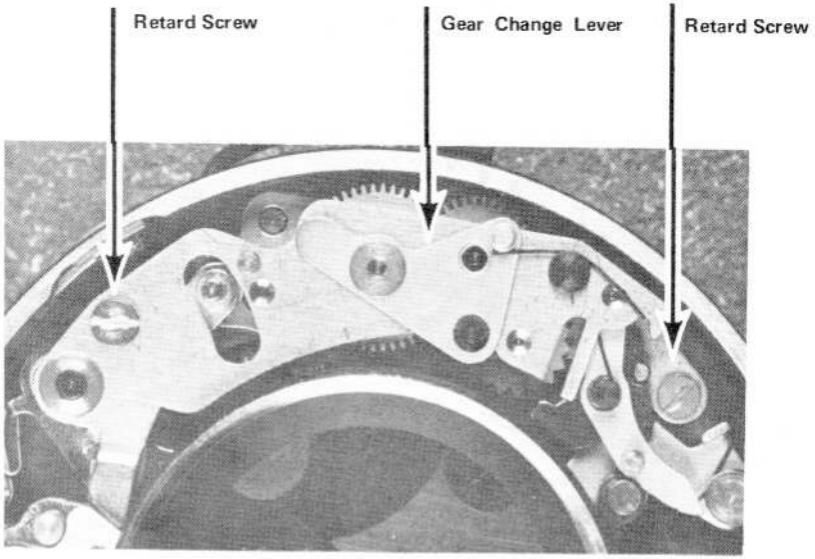
To remove the shutter setting plate and shaft, turn the shutter over and push out the pin from the shaft. The "Petri Pin Pusher" tool as described in the March/April 1972 **SPT Journal** will work fine. Remove the two E clips, one on top of the other. To remove the plate the shutter main lever will have to be turned away from the home position to allow the plate to clear the lens barrel. The plate and shaft will drop out.

Now, if you wish, the main lever can be removed. First, pry the end of the main spring out of its track near the M synch release lever bearing. Gently ease

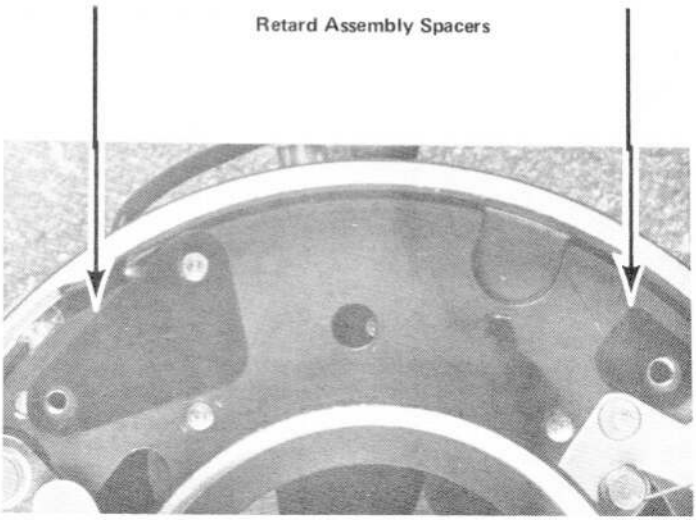
To remove the time delay retard, remove first the brass screw holding the time delay release link. Lift up the link assembly. Note the two springs. Remove the E clip on the retard shaft. Turn the special retard lock screw about 90^{o} to line it up with the slot in the bottom plate of the time delay retard. Set the time delay setting lever half-way, and lift the retard out.

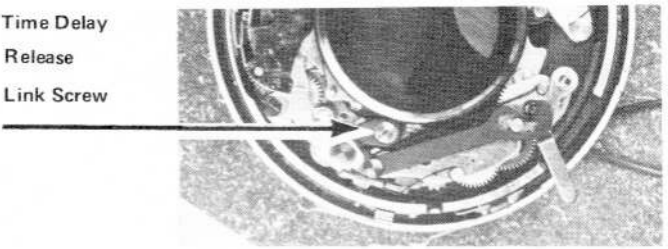
Remove the M synch lever screw and then the lever. (Caution! This is a left hand screw!) Note that there are several notches for the spring underneath to fit into. Now revealed is the M synch gear train, the bulb lever, the inner release lever, the M synch release lever, and the M synch contacts. Lift off the bulb lever spring, the bulb lever bearing, the bulb lever and the M synch lever spring.

To remove the M synch gear train remove the brass screw in the bottom

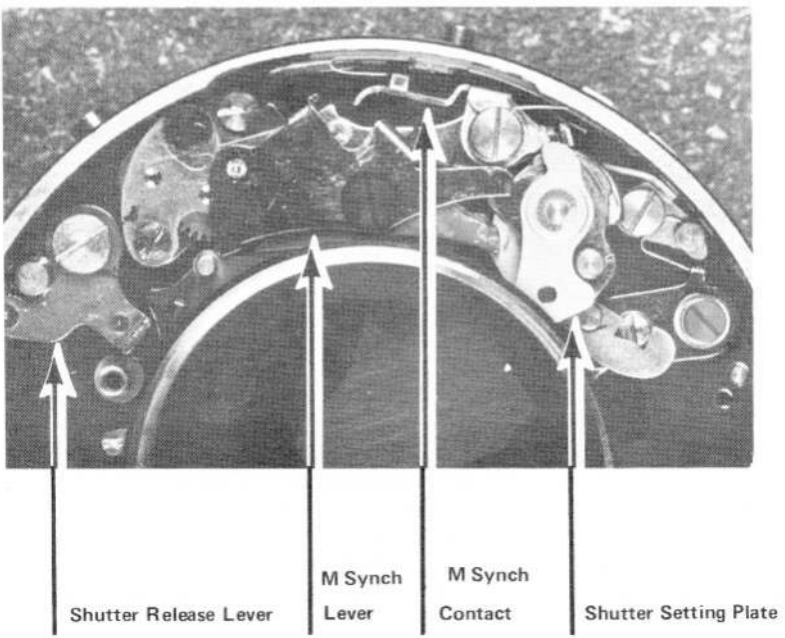


The retard assembly.

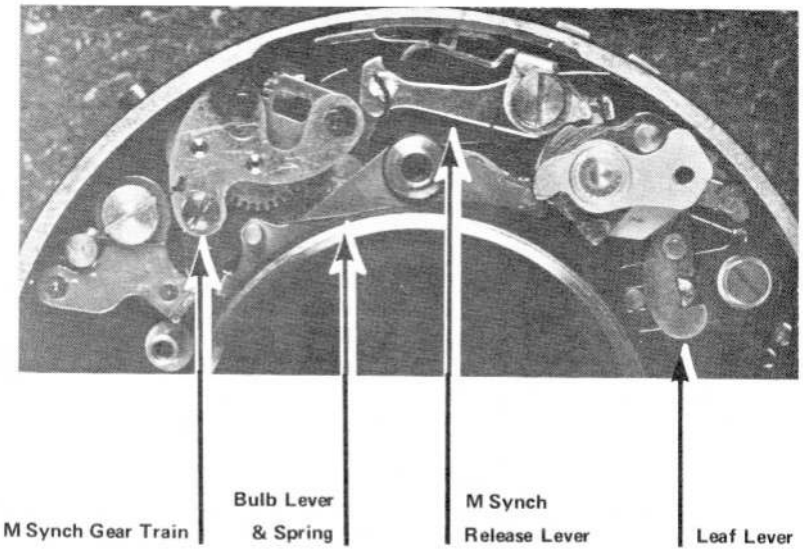




The special time delay retard lock screw is just barely seen to the right of the time delay release link screw.



Closeup of the shutter release and M synch sections. Both the retard and time delay sections have been removed.



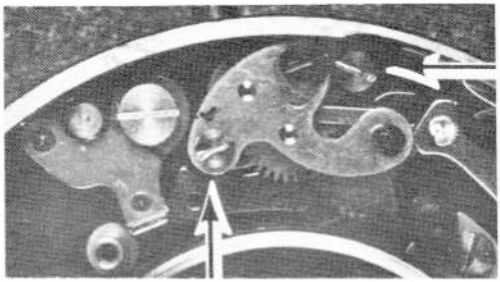
The M synch section with the M synch lever removed.

the main lever up, and at the same time ease the end of the mainspring up the bearing just indicated. At the top release the spring pressure as gently as possible. The main spring will drop down, and the main lever and then the main spring can be lifted off. Now visible is the X synch contact. The flash contact strip can be removed by taking out the two screws from the outside, one at each end. Note the insulators.

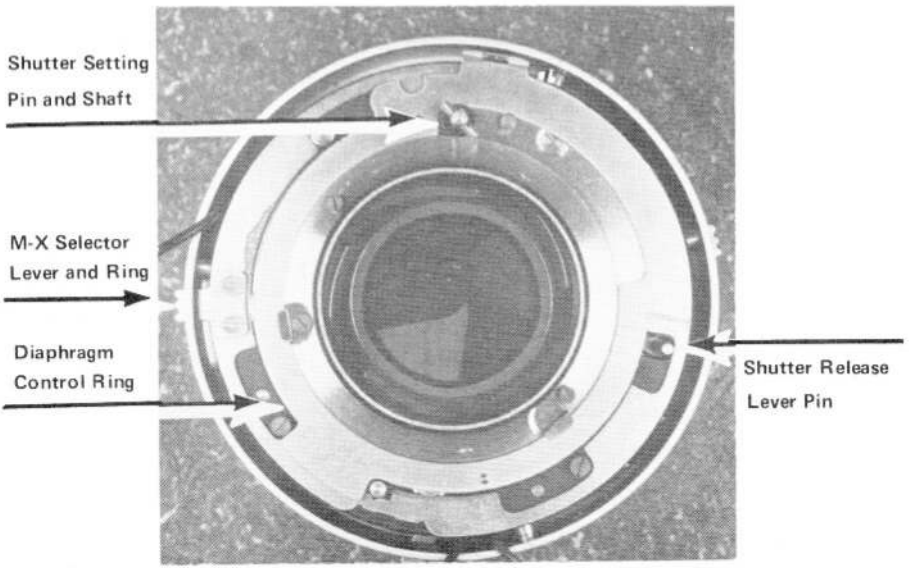
To gain access to the shutter and diaphragm blades, remove from the back of the shutter the two screws and clips retaining the diaphragm linkage ring and lift off the ring. The M-X selector ring can be removed at this point through removal of the three screws holding it. However, it is not necessary to remove the M-X ring to gain access to the shutter or diaphragm blades. Remove the four screws on the outer portion of the shutter housing. Note that the longer screws (2) go opposite the main lever. Carefully lift the shutter housing off of the shutter mechanism plate. There are five shutter blades.

Proper installation of the shutter blades is very important. There are five shutter blades for the five shutter blade positions. The first blace position is the position closest to the main lever. However, all the shutter blades have spacers and one shutter blade, the fifth and last one, has two spacers, both different.

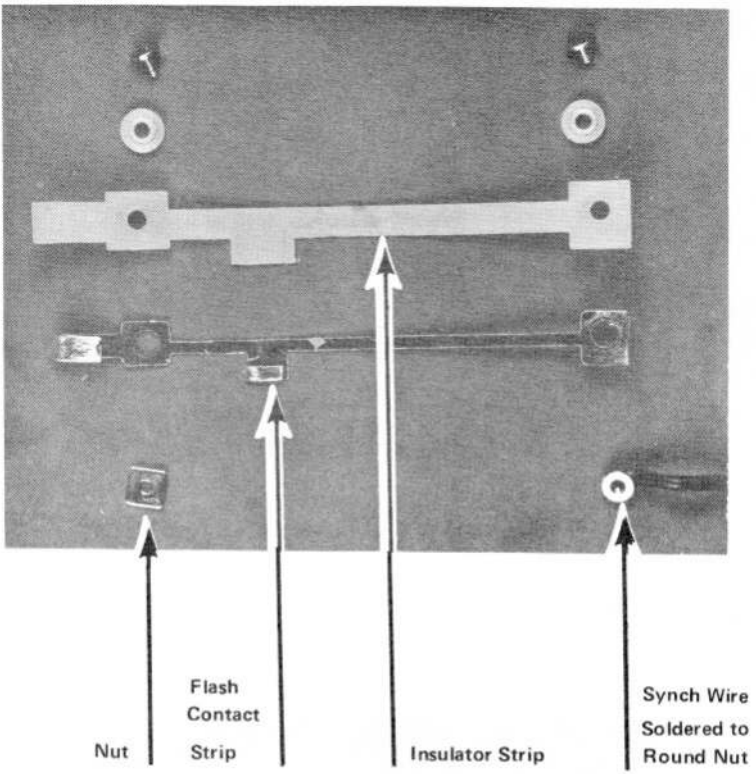
The proper assembly sequence is to first install the bottom (towards the front of the shutter) spacer of the fifth blade so that the studs face you. Then



M synch gear train showing attaching screws (2).



The back of the shutter.



Flash contact parts.

install the first blade spacer and then the first blade. Continue in a clockwise direction. The fifth blade will go on top of its spacer, which is partially under the first blade. On top of the fifth blade put the final spacer, the one with no studs.

To remove the diaphragm blades, remove the two screws in the diaphragm cover plate. There are five blades laid counter-clockwise with the tails (smallest portion) of the blades pointing counter-clockwise. The diaphragm blade control ring should be turned to its most counter-clockwise position (as seen from the shutter front) for the wide open position.

Theory of Operation

Shutter Setting –

To set the shutter, the camera transport rotates the shutter setting plate shaft and pin about 90^{o} in a clockwise direction. A pin on the top of the main lever is caught by the shutter setting plate and the main lever is turned against the tension of the main spring to the set position where it is latched by the M synch release lever. The shutter setting plate may now be returned to its starting position by the camera transport system and the main lever will remain in its set position.

When the main lever was being set by the shutter setting plate, the M synch

lever was also being set by a projection on the shutter setting plate. The M synch lever is also latched by the M synch release lever, but the opposite end.

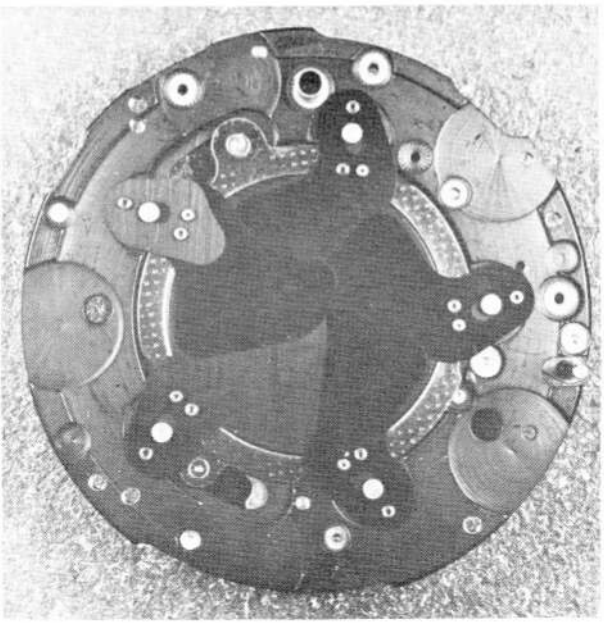
If the time delay is to be used, then the time delay setting lever is moved clockwise to set the time delay gear train. This allows the time delay link to move towards the release lever, and the time delay release pawl moves behind the set position of the M synch plate. The time delay gear train is prevented from running down by a long tab on the time delay pawl which now rests against the time delay pallet and prevents its movement.

Shutter Release –

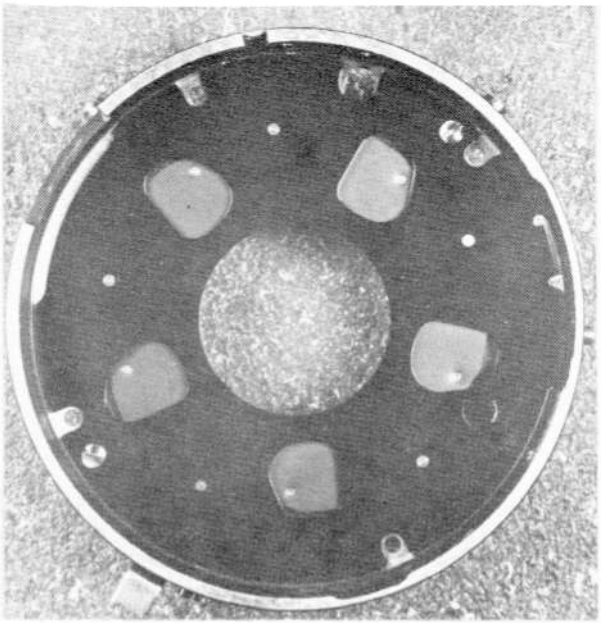
The camera shutter release linkage causes the shutter release lever to pivot counter-clockwise where a pin on its underside strikes the angled end of the inner release lever and cams it towards the inside of the shutter (counter-clockwise also).

The movement of the inner release lever allows the M synch release lever to drop off the end of the inner release lever, but to be caught by the secondary latch which is attached to the inner release lever. The M synch release lever is allowed to move far enough to release the tab of the M synch lever, but not far enough to release the main lever.

If the time delay has been set, the M synch lever will hit the time delay release pawl, forcing the pawl against one of the M synch gear train top plate screws. Thus, the M synch lever traps the time delay pawl so that only the running down of the time delay gear train can pivot the pawl out of the way of the M synch lever. The time delay gear train does start to run down at this point because the trapping of the pawl moves its long tab out of contact with



The back side of the shutter mechanism plate showing the shutter blades in place. The main lever bearing is at the top.



The diaphragm cover plate.

the time delay gear train pallet.

We will ignore flash synch for the time being.

With the time delay release point out of the way, the M synch lever can turn counter-clockwise under spring tension. At the end of its travel a tab on the underside of the M synch lever strikes the secondary latch, releasing the M synch latch fully. The M synch latch pivots out of the way of the main lever, which begins to turn in a clockwise direction. The leaf lever, attached to the bottom of the main lever, is sprung so as to pick up the pin from the blade operating ring. The main lever, being driven by the main spring, pushes the leaf lever and the blade operating ring in a clockwise direction, opening the shutter blades. Note that the shutter blades have been closed until now by the tension of the bounce spring holding the blade operating ring in a counter-clockwise direction.

When the shutter blades reach full open position, several things can happen, depending upon the shutter speed cam position.

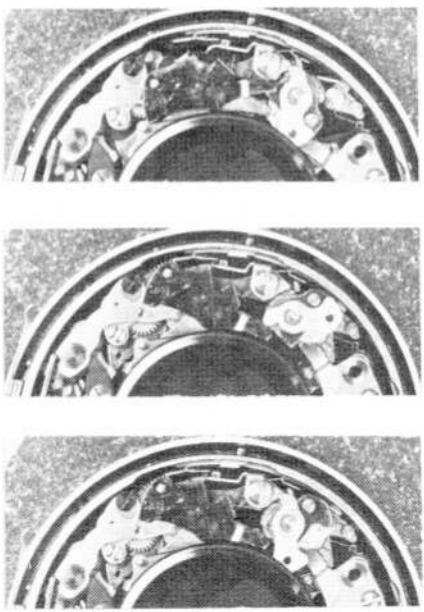
If the bulb position was selected, then the bulb lever is permitted to come towards the inside of the shutter. When the shutter release lever is activated, a tab on the shutter release lever holds the bulb lever against the lens barrel of the shutter. With the bulb lever in this position, its other end stops the main lever at the position where the blades are full open. As soon as the release lever is allowed to start returning to its home position, the bulb lever is freed to pivot out of the way of the main lever which is allowed to complete its travel and close the shutter blades. The retard does not engage the main lever when the shutter speed cam is set to bulb.

If the 1/500 speed were selected, then the bulb lever would be held out of engagement with the main lever, as would be the retard. Therefore, the blades open and close just as fast as the main lever can drive them. There is no retard or regulation whatever.

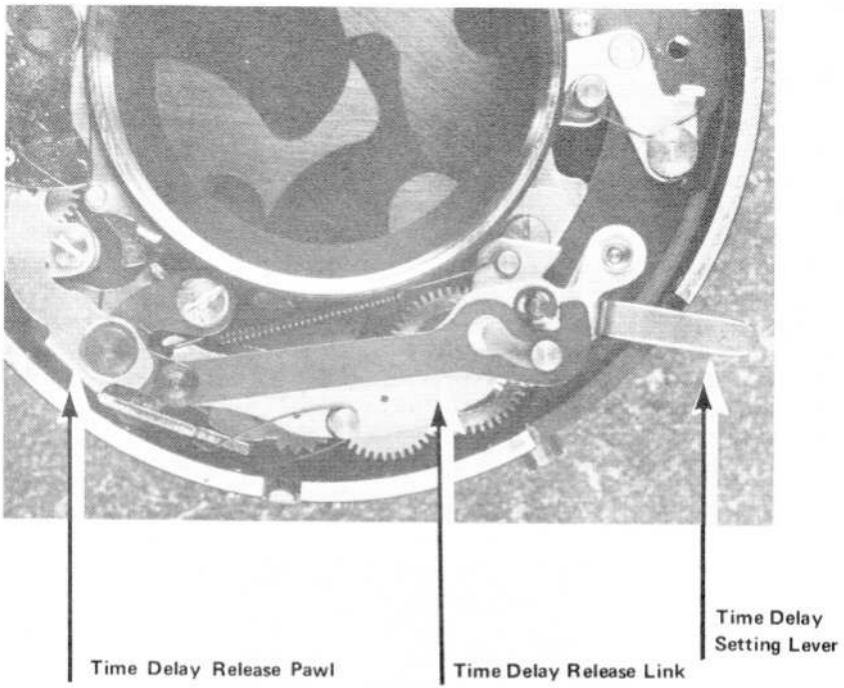
If the speeds 1/250 through 1 second are selected, then the bulb lever is held out of engagement with the main lever, but the retard is allowed to slow the main lever travel, while the blades are wide open, in varying amounts. On the speeds 1, 1/2, 1/4 the retard is run as a full gear train with pallet retard. On the speeds 1/8, 1/15 and 1/30 the retard is run as a partial gear train with pallet retard. On the speeds 1/60, 1/125 and 1/250 the retard is run as a partial inertia gear train.

Flash synch –

X synchronization is provided by the X synch lever which is located underneath the leaf lever. The X synch lever stradles the drive pin on the blade operating ring so as the blades open through the action of the blade operating ring, the X synch lever pivots. A tab on the X synch lever pulls a spring attached to the X synch contact when the blades are wide open. Thus, X synch



Shutter setting sequence. The topmost picture shows the unset condition. The middle picture shows the set condition. The bottom picture also shows the set condition but with the shutter setting plate back at its original position.

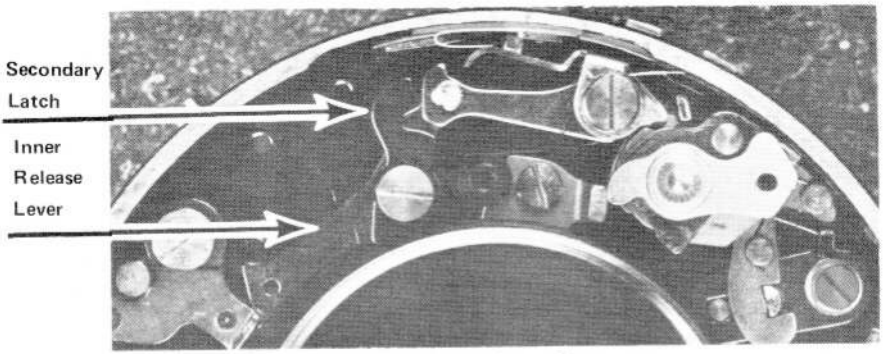


Closeup of the time delay retard assembly. Note the long tab on the time delay release pawl that contacts the time delay gear train pallet. Note also in the top right hand corner the bounce spring for the blade operating ring.

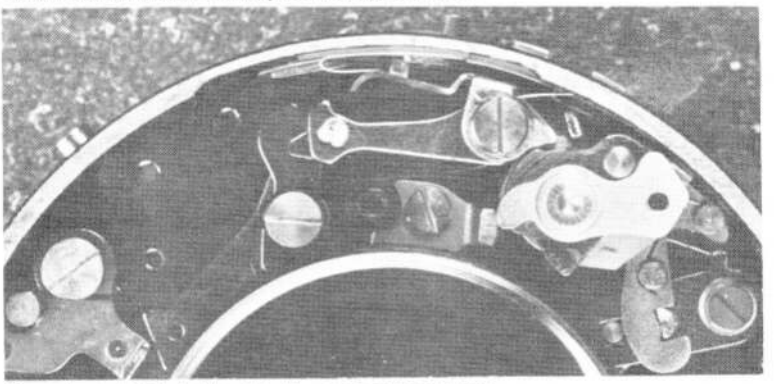
contact is made only when the blades are wide open.

The M synchronization is a bit more complicated. On the bottom of the M synch lever is a pin which engages a slot in the M synch gear train sector gear. The M synch gear train is a simple inertia retard. Thus, when the M synch lever is unlatched by the M synch latch, the M synch lever is driven by the M synch drive spring, but is retarded by the M synch gear train. The M synch contact is allowed to close shortly after the M synch lever is unlatched. The M synch delay time is the time the M synch lever takes to complete its travel after the M synch contact closes and until the M synch lever hits the secondary latch to free the M synch latch further thereby freeing the main lever, etc.

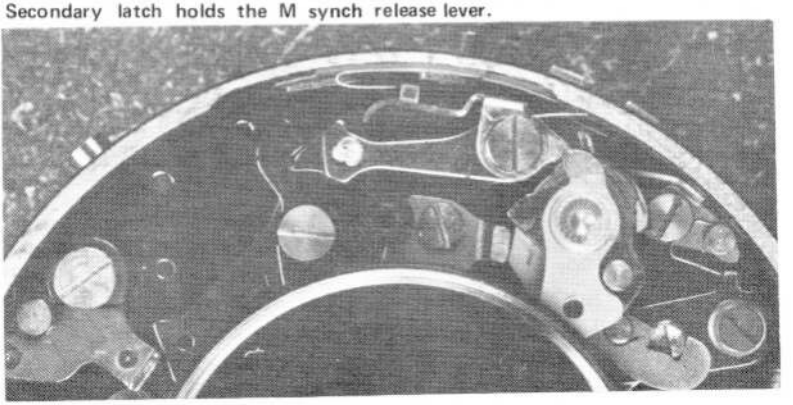
When the main lever actually starts to open the blades, a cam surface on the main lever contacts the M synch contact and opens the synch contact so current can no longer go through. The only time



Inner release holds the M synch release lever pin.



Secondary latch holds the M synch release lever.



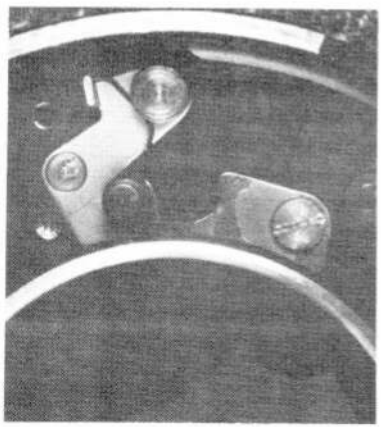
The shutter completely released.

this cam surface will allow the M synch contact to close is when the shutter is fully set. However, when the shutter is set a tab on the M synch lever holds the M synch contact open. When the M synch lever is unlatched and moves away from the M synch contact, the M synch contact is allowed to close. As you can see, the only condition under which the M synch contact is allowed to close is when the main lever is set but the M synch lever is unset.

The X synch contact operates all the time, even when M synch has been selected. When the selector is moved to the X position, a tab on the M-X selector lever contacts the M synch contact and holds it open all the time.

Adjustments

The only notable adjustment, besides the pallet for the retard, is the spring tension for the M synch lever.



The blade operating ring bounce spring is shown on the left and the limit plate on the right. The limit plate must be removed to take the blade operating ring out for cleaning.

LETTERS TO THE EDITOR

Dear Fellow Technician,

Just received the Jan./Feb. issue! But boy is it great! Now maybe I understand the long delay. Your good idea is what we have sorely needed. The Petri 35 should be a cinch now. I liked the completeness of the preliminary description. Congratulations.

Gene Knapp
Carmichael, Ca.

To: SPT

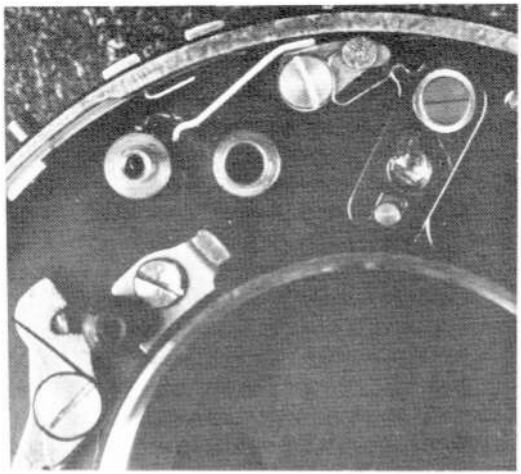
I, Terry Burns, hereby authorize you to withdraw from my account No. 5666 with National Camera Repair Inc., $11.69 for SPT dues. . . . I assume you can get money from N.C.R.S. since you were connected with the "Camera Craftsman" for a while.

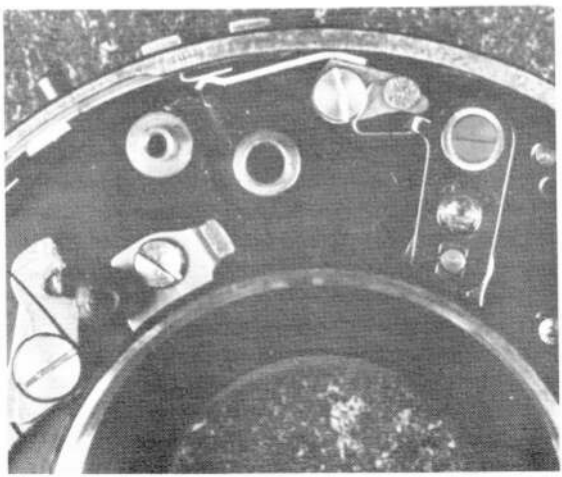
Terry Burns
Logan, Ohio

Dear Mr. Burns,

We are sorry but we cannot transfer money from your National Camera account since SPT is not affiliated with N.C.R.S. When the President of National Camera was also President of SPT we were located in his facility and the SPT Service Notes appeared in the "Camera Craftsman". When Mr. Amos became President of SPT the organization was relocated. . . .

Editor





Synch contact action is shown above. Note the important part the X synch contact spring plays. The secondary latch and its spring are seen clearly at the left.